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(54) **Parcel dispatch manager system and method**

Paketeversandverwaltungssystem und -verfahren

Système et méthode de gestion d'expédition de paquets

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Description

[0001] The present invention relates to parcel sorting and delivery and more particularly to a parcel sorting system and method for automating manifest generation, parcel placement in racks, and latter controlled access to the parcels. The invention has use in parcel delivery and in particular to steps taken during preparation of delivery vehicles for their delivery rounds.

[0002] Parcels are delivered by public and private concerns, including national post offices like the United States Postal Service and corporate delivery services like Federal Express and DHL. Parcels arrive at a central location and are distributed to delivery vehicles which will complete the last leg of the parcels journey to the delivery address. Delivery vehicle drivers usually wait for their parcels by a conveyor belt or the like. It is the driver responsibility to note the delivery addresses of the parcels, plan a delivery route according to the addresses, and load the delivery vehicle in an ordered manner such that parcels can be later retrieved. These tasks are time consuming, tedious, stressful and prone to human error. Where an error is made with a parcel, the driver must redirect his route and/or a delay occurs in parcel delivery. As with all businesses, the pressures on the driver are passed to the delivery service which is ever mindful of balancing quality, customer service and costs while providing additional services like alternate delivery addresses - yet another consideration for the driver. Accordingly, a need exists for tools to assist the driver and delivery service with the aforementioned burdens.

[0003] US Patent 5,038,283 is directed to a method for handling items during the intermediate steps from when the items are initially shipped out by the sender until they are received at their ultimate destination. Such intermediate steps are typically carried out between sender warehouse, where the goods are loaded into containers, and a destination warehouse, where the goods are repackaged for further shipping. Beginning with the sender warehouse, items and the containers in which they are to be shipped are bar coded. The items bar code is manually scanned into a database record along with the respective container bar code. Records are then grouped by container, the group therefore including a list of all items therein. The receiving warehouse and particular shipping means information is associated with the group. The group is then electronically transmitted to a destination warehouse computer and in particular to a destination warehouse database resident therein. The destination warehouse database includes a second grouping of items based on customer order lists. When the container is ultimately physically received at the destination warehouse, the items bar codes are again manually scanned. Based upon the first grouping, the destination warehouse is able to identify the item just scanned and identify to which customer (if any) the item is intended by querying the second group. If a match is found for the just scanned in item and the second group, the computer outputs a particular destination, within the destination warehouse, for the just scanned in item to be forwarded to select locations within the destination warehouse identified by a single letter for mating with other customer items. If the respective customer list is filled, the customer items, as may be obtained from within the destination warehouse and/or recently received containers, are packaged and shipped. The destination warehouse computer is programmed to consider and/or assign priorities to the sorting of incoming items based on, for example, necessity in filling outstanding and/or priority orders. Lastly, the containers bar codes may serve as a confirmation of receipt from the destination warehouse to the shipping warehouse.

[0004] The present invention differs from the above method in that the present invention is directed to improving sorting between shipper and ultimate receiver. Herein, while the shipper may be a warehouse, the ultimate receiver is the private customer. Delivery is effected over a delivery route having numerous, distinct, and spaced apart destination points whereas in the above example, a container is shipped to a single warehouse and within the warehouse a further sorting to locations within the warehouse is made - the locations identified by a single letter. Accordingly, a completely different set of data with different criteria is to be considered. In particular, the sequence of items becomes paramount, whereas the sequence of items in the above noted method is of considerably less importance as all the items in a container are bound for the destination warehouse regardless of their order within the container. Accordingly, the sequence of items in the present invention is considered twice, a first time with respect to the items loading in a transport means and a second based upon destination address sequence within a delivery route.

[0005] It is an advantage of the present invention to relieve the driver of the burdens of sorting and loading parcels as well as generating a manifest and planning a delivery route. It is a further advantage to free up the driver's preparation time so that more time is available for deliveries and customer service. It is a further advantage to provide the delivery service with a delivery preparation scheme having reduced error while mindful of alternative delivery services. These and other advantages are realized by a system and method for automatically sorting parcels as they are loaded onto delivery trucks, generating and updating parcel manifests, and optimizing delivery routes. In operation, an identifier or parcel information, such an identification (ID) code and/or delivery address, is read off of a parcel by scanning as the parcel is conveyed to a loading rack. The parcel is sequentially loaded into a sequential position within the rack. Once a rack is full, or no more parcels are present for delivery, the rack is loaded onto a delivery vehicle. Parcel identifiers or information is matched to a sorting code. The resulting match (or assignment) list is then stored in at least one database. The sorting code is a unique code identifying a unique delivery address. Con-

sideration is also given to preexisting arrangements present for the parcel's delivery - such as an alternate address which is substituted into the parcel data. A search is performed of the match list for delivery addresses along a particular delivery route. A hit list is generated which is then sorted, e.g. by routing software, to an order consistent with a time optimized delivery route. A manifest is then generated with the sorted hit list and other information.

[0006] The advantages are further realized by a method of sorting parcels, comprising the steps of: decoding a parcel identifier; matching said identifier to a sort code, said sort code uniquely associated with a delivery address; loading said parcel into a rack space; repeating said steps of decoding, matching loading for a plurality of parcels; generating a first list comprising identifiers matched to sort codes; generating a second list comprising parcel sequence and rack space; merging said first and second list to form a third list; cross checking said third list with a fourth list for possible matches therebetween; and generating a fifth list comprising said possible matches.

[0007] The advantages are still further realized by a system for automating parcel sorting, comprising: a scanner for decoding a plurality of parcels identifiers in a first sequence; computer means comprising: a first interface for receiving decoded identifiers; matching means for matching decoded identifiers with sort codes; compiling means for generating a first list of said matching; a second interface for receiving a second list comprising said first sequence; merging means for merging said first list and said second list; a second interface for receiving a third list, said third list comprising a plurality of identifiers; and comparing means for comparing said third list and said second list and generating a fourth list of matches; and computer input means in communication with said second interface, said computer input means generating said third list.

[0008] These and other advantages will become clear from the following detailed description and appended claims. The invention will be described in accordance with the following figures wherein like numerals refer to like parts.

Figure 1 depicts a flowchart of the present method;
Figure 2 depicts an overview of the present system;
Figure 3 depicts flow of data according to the invention;
Figure 4 depicts interface of database according to the invention;
Figure 5 depicts data sorting according to the invention; and
Figure 6 depicts a manifest and mobile rack.

[0009] The present invention is directed to a parcel dispatch manager system and manager (PDM). The PDM may comprise a computer having a processor, memory, input and output means. Computer may incorporate a client-server arrangement. Software, operating on the computer causes the relevant method steps below to take place. The software is not limited to a particular language or algorithm but for execution of the method below. Accordingly, the software can be generated by one skilled in the art. Likewise, the hardware and computer configuration is a matter of design choice.

[0010] Figure 1 depicts a flowchart of the present method. The method begins at 100 and proceeds to the next step of conveying a parcel to a scanner 102. Conveyance is normally performed by a conveyor belt or similar such means. The parcel includes several identifiers or information, including an identification (ID) code and delivery address. The parcel is scanned 104 and an attempt to obtain the ID code is made 106. The ID code, as is known in the art, uniquely identifies the parcel and may comprise a bar code (not shown). A determination is made whether the ID code scan was successful (decodable) 108. If the scan was successful 134, the method continues to step 132. If the scan was unsuccessful 110, a second scan is attempted with a videocoding device 112. A second determination is made whether the scan was successful 114, and if not 116, the ID code is manually read 118. If the scan was successful 115, the method continues to step 132. A third determination is made whether the ID code was successfully read, 120, and if not 122, the parcel is removed from circulation for further processing 124. The method then returns 130 to the next parcel to be conveyed 102. If the read was successful 117, the method continues to step 132.Alternatively, method may continue to the step of obtaining the address from the parcel scan (132) and omit all future steps involving the ID code.

[0011] An attempt is then made to obtain the address from the scan of the parcel 132. A determination is made whether the address was successfully read by the scan 136. If the scan was successful (138) the method continues to step 140 wherein the ID code and address are stored in at least one database. If the address scan was not successfully read 142, the scan is repeated with the videocoding device 144. A determination is again made whether the scan successfully read the address 146. If the scan was successful (148) the method continues to step 140. Where the scan, via the videocoding device, was unsuccessful (150) the parcel address is manually read 152. A determination is made whether the address is manually readable 154. If the read was successful, the method continues to step 140. If the address is not readable 156, the parcel is set aside for further processing 158. Such processing may include sending the parcel back to the sender or customer, disposal, and the like. The method then returns 160 to step 102. Where the address is readable via manual inspection (162), the method continues to step 140. The ID code and parcel address may be stored in the same or different databases located locally or remotely as a matter of design choice.

[0012] A search is conducted of a storage medium containing service agreements and other understandings effected between customer and delivery service 164. The

storage medium may be the at least one database. The search is part of a determination of whether the service agreement or understanding (if present) includes an alternate delivery address associated with the parcel or destination address 166. The alternate delivery address may also be effected by the recipient at the delivery address, as may occur from a vacation or relocation. Such alternate delivery addresses may include other delivery locations, holding the parcel at franchise, lock box, local post office or delivery service, etc. Where it is determined that an alternate delivery address is present 168, the alternate delivery address is substituted for the delivery address 170 at the stored location effected during step 140. Where no alternate delivery address is found 172, a matching of the parcel address to a sort code is made 174. Sort codes are unique codes that identify a unique destination. ID Codes are then matched to the sort codes 176 by methods known in the art. The sequence from which the parcels were scanned is also matched to the sort codes 178. The parcels are loaded, manually or automatically, onto a mobile rack, in the sequence of receipt and scan 180. The lists of matches (or assignments) are stored in the at least one database separately or complied into one formal list and stored in a single (or with backup) location 182.

[0013] A determination is made whether the mobile rack is full 184. If the rack is full 186, the rack is loaded onto the delivery truck and a new rack is introduced to receive parcels 188. And the method continues to step 190. If the rack is not full 192, the method continues to step 190, wherein, a determination is made whether there are other parcels to be delivered along the route of the delivery vehicle. If other parcels are present 194, the method returns to step 102 and the next parcel is scanned. If there are no more parcels to be scanned 196, the at least one database will now contain a list of all of the scanned parcels sorted by sort code. The at least one database is now queried for a list of all parcels matching select sort codes (or delivery addresses0, the select sort codes being along a particular delivery route 198. A hit list is generated and sorted and produced in a manifest with the aid of routing software 200. The hit list may be ordered such that the driver's stops are minimized along a select route. The routing software is known in the art. The hit list will contain at least a rack location, delivery address and order of delivery (50, figure 6). The manifest is stored in the at least one database 202 and communicated to the delivery vehicle driver via paper or electronic format 204. An optional map detailing the route and delivery may also be provided. The latter instance, the driver is equipped with a mobile data receiving device such as a personal digital assistant, mobile telephone and the like. The method then ends 206.

[0014] Figure 2 depicts an embodiment of the present system. Herein parcels 24 are transported by conveyor belt 19 below an overhead scanner 20. The scanner 20 may comprises a bar code reader, videocoding device or other optical scanning apparatus. The scanner 20 may further include optical character recognition means where necessary. Scanner 20 obtains the ID code and delivery address from parcel 24 which are then directed to PDM 23. As an alternative to an overhead scanner, a hand held scanner 22 may be employed with the data so obtained also directed to PDM 23. Parcels are then either loaded onto mobile rack(s) 27 in the order of conveyance or manually set aside 25 for further handling.

[0015] Figure 3 depicts databases arranged to receive parcel data. The ID codes 30 and sort codes 32 are matched, by the PDM performing a method known in the art, and stored in a first database 33, ID-Code database. The sequence in which the parcels were conveyed or scanned (bar code and/or videocoding) 35 is stored in a second database 34, Track & Trace database. Like elements are assigned like numerals throughout the figures.

[0016] Figure 4 depicts the collecting of data by the PDM 23 The matched ID codes and sort codes are retrieved 38 from database 33. Addresses are assigned to the sort codes, via a matching procedure performed by the PDM. The matching procedure is known in the art. The addresses are retrieved from an address database 42. Where the addresses are already known from the parcel, this step if omitted. The sequence of parcels 35 is also retrieved 36 from database 34. The PDM then receives a search query, from user 44, for all hits along a particular sequence of addresses. Figure depicts execution of this search. Herein a sequence of parcels 62 (matched ID codes with sort codes and/or delivery addresses with sort codes) is searched 64 for a matches or hits with a list of addresses 66 inputted 68 into the PDM 23 by end user 44 (Fig. 4). An output list 70 is produced 69 setting out the matched addresses (herein addresses 2, 5, 7), in the order of the sequence input 42 (herein numerical) along with rack position(s) of the parcels associated (via sort code or delivery address) with the resulting addresses (2, 5, 7). The output may be generated in the form of a manifest 50 depicted in figure 6. Herein, an address 51 appears, along side a sequence number 53 of which the parcel was loaded into the rack and partition number (rack location) 55. The lists may be sorted in any order imagined by one skilled in the art. A mobile parcel rack 27 is also depicted having numerous spaces 72 for parcels. A close up of the spaces and their moveable partitions 52 is also depicted. Arrow 60 indicates the order of loading the parcels from the scanning operation.

[0017] The invention being thus described, it will be obvious that the same may be varied in many ways.

Claims

1. A method of sorting parcels, comprising the steps of:

   - decoding a parcel (24) identifier (104);
   - matching said identifier to a sort code, said sort code uniquely associated with a delivery ad-

dress (174, 176);
- loading said parcel into a rack space (178);
- repeating said steps of decoding, matching loading for a plurality of parcels (194);
- generating a first list comprising identifiers matched to sort codes (38, 49);
- generating a second list comprising parcel sequence and rack space (35, 36);
- merging said first and second list to form a third list (62);
- cross checking said third list with a fourth list comprising addresses (66) inputted by a user (44) for possible matches therebetween (64, 66, 68); and
- generating a fifth list comprising said possible matches (70).

2. The method according to claim 1, further comprising the steps of:

- storing said first list in a first database (33), said second list in a second database (34);
- sorting said fifth list in order of delivery address along a delivery route (68); and
- generating a manifest (50) comprising said sorted fifth list (69, 70).

3. The method according to claims 1-2, wherein said identifier comprises an identification code (106).

4. The method according to claim 1-3, wherein said identifier also comprises a delivery address (132).

5. The method according to claim 1-4, wherein said identifier comprises a delivery address (132).

6. The method according to claim 1-5, wherein said step of decoding, further comprises the step of scanning said parcels (24) with an optical scanner and decoding characters on said parcels, said characters comprising said identifier.

7. The method according to claim 6, wherein said optical scanner is an overhead bar code reader (20) and said characters are bar codes, and said step of decoding further comprises the step of automatically conveying said parcels below said overhead scanner (19).

8. The method according to claim 6, wherein said optical scanner is a hand held bar code reader (22) and said characters are bar codes.

9. The method according to claim 6, wherein said optical scanner is a videocoding device including optical character recognition means, and said characters are alphanumeric characters.

10. The method according to claim 1-9, wherein said racks are mobile racks (27) comprising movable partitions (52), and wherein a plurality of parcels (24) are loaded sequentially (60) into sequential positions in said mobile racks, said sequential positions defined by said movable partitions.

Patentansprüche

1. Verfahren zum Sortieren von Paketen, das folgende Schritte umfasst:

- bei einem Paket (24) Entschlüsseln einer Kennung (104);
- Abgleichen besagter Kennung mit einem Sortierschlüssel, wobei besagter Sortierschlüssel einer Auslieferungsadresse eindeutig zugeordnet ist (174, 176);
- Laden des besagten Pakets in ein Regalfach (178);
- Wiederholen besagter Schritte des Entschlüsselns, Abgleichens, Ladens für eine Vielzahl von Paketen (194);
- Erzeugen einer ersten Liste, die Kennungen enthält, die mit Sortierschlüsseln übereinstimmen (38, 49);
- Erzeugen einer zweiten Liste, die die Paketreihenfolge und das Regalfach enthält (35, 36);
- Vereinigen der besagten ersten und zweiten Liste, um eine dritte Liste zu erzeugen (62);
- Gegenkontrollieren der besagten dritten Liste mit einer vierten Liste, die Adressen (66) enthält, die von einem Anwender eingegeben (44) wurden, auf mögliche Übereinstimmungen zwischen ihnen (64, 66, 68); und
- Erzeugen einer fünften Liste, die besagte mögliche Übereinstimmungen enthält (70).

2. Verfahren nach Anspruch 1, das ferner die folgenden Schritte umfasst:

- Speichern besagter erster Liste in einer ersten Datenbank (33), besagter zweiter Liste in einer zweiten Datenbank (34);
- Sortieren besagter fünfter Liste in der Reihenfolge der Auslieferungsadressen auf einer Auslieferungsroute (68); und
- Erzeugen eines Ladeverzeichnisses (50), das besagte sortierte fünfte Liste enthält (69, 70).

3. Verfahren nach Anspruch 1-2, wobei besagte Kennung einen Identifizierungsschlüssel (106) enthält.

4. Verfahren nach Anspruch 1-3, wobei besagte Kennung ferner eine Auslieferungsadresse (132) enthält.

5. Verfahren nach Anspruch 1-4, wobei besagte Kennung eine Auslieferungsadresse (132) enthält.

6. Verfahren nach Anspruch 1-5, wobei besagter Schritt des Entschlüsselns ferner den Schritt des Einlesens besagter Pakete (24) mit einem optischen Lesegerät und des Entschlüsselns der Zeichen auf besagten Paketen umfasst, wobei besagte Zeichen ferner besagte Kennung enthalten.

7. Verfahren nach Anspruch 6, wobei besagtes optisches Lesegerät ein oben angeordneter Strichcodeleser (20) ist und besagte Zeichen Strichcodes sind, und besagter Schritt des Entschlüsselns ferner den Schritt des automatischen Beförderns besagter Pakete unterhalb des oben angeordneten Lesegeräts (19) umfasst.

8. Verfahren nach Anspruch 6, wobei besagtes optisches Lesegerät ein Hand-Strichcodeleser (22) ist und besagte zeichen Strichcodes sind.

9. Verfahren nach Anspruch 6, wobei besagtes optisches Lesegerät ein Videocodierungsgerät mit Mittel zur optischen Zeichenerkennung ist und besagte zeichen alphanumerische zeichen sind.

10. Verfahren nach Anspruch 1-9, wobei besagte Regale mobile Regale (27) sind, die bewegliche Trennwände (52) umfassen, und wobei eine Vielzahl von Paketen (24) nach der Paketabfolge (60) in der Reihenfolge entsprechende Positionen in besagte mobile Regale geladen wird, wobei besagte der Reihenfolge entsprechende Positionen durch besagte bewegliche Trennwände definiert werden.

Revendications

1. Procédé de tri de colis, comprenant les étapes qui consistent à :

   - décoder l'identifiant d'un colis (24) (104);
   - faire correspondre l'identifiant à un code de tri, ledit code de tri étant associé de manière univoque à une adresse de distribution (174, 176) ;
   - charger le colis dans un espace d'étagère (178) ;
   - répéter les étapes de décodage, de mise en correspondance et de chargement pour une pluralité de colis (194) ;
   - générer une première liste comprenant les identifiants mis en correspondance avec des codes de tri (38, 49) ;
   - générer une deuxième liste comprenant une séquence de colis et un espace d'étagère (35, 36) ;
   - fusionner la première et la deuxième listes pour former une troisième liste (62) ;
   - à recouper de la troisième liste avec une quatrième liste comprenant des adresses (66) introduites par un utilisateur (44), pour trouver des correspondances possibles entre elles (64, 66, 68) ; et
   - générer une cinquième liste comprenant lesdites correspondances possibles (70).

2. Procédé selon la revendication 1, comprenant, en outre, les étapes qui consistent à :

   - stocker la première liste dans une première base de données (33) et la deuxième liste dans une deuxième base de données (34) ;
   - trier la cinquième liste dans l'ordre des adresses de distribution le long d'un chemin de distribution (68) ; et
   - générer un manifeste (50) comprenant la cinquième liste triée (69, 70).

3. Procédé selon les revendications 1 et 2, dans lequel l'identifiant comprend un code d'identification (106).

4. Procédé selon les revendications 1 à 3, dans lequel l'identifiant comprend également une adresse de distribution (132).

5. Procédé selon les revendications 1 à 4, dans lequel l'identifiant comprend une adresse de distribution (132).

6. Procédé selon les revendications 1 à 5, dans lequel l'étape de décodage comprend, en outre, l'étape qui consiste à scanner les colis (24) au moyen d'un scanneur optique et à décoder les caractères présents sur les colis, les caractères formant ledit identifiant.

7. Procédé selon la revendication 6, dans lequel le scanneur optique est un lecteur de code barre suspendu (20) et les caractères sont des codes barre, et l'étape de décodage comprend, en outre, l'étape qui consiste à transporter automatiquement les colis en dessous du scanneur suspendu (19).

8. Procédé selon la revendication 6, dans lequel le scanneur optique est un lecteur de code barre tenu à la main (22) et les caractères sont des codes barre.

9. Procédé selon la revendication 6, dans lequel le scanneur optique est un appareil de vidéocodage comprenant des moyens de reconnaissance de caractères optiques, et les caractères sont des caractères alphanumériques.

10. Procédé selon les revendications 1 à 9, dans lequel les étagères sont des étagères mobiles (27) comprenant des séparations mobiles (52), et dans lequel

une pluralité de colis (24) sont chargés de manière séquentielle (60) dans des position séquentielles des étagères mobiles, les positions séquentielles étant définies par les séparations mobiles.

FIG 1

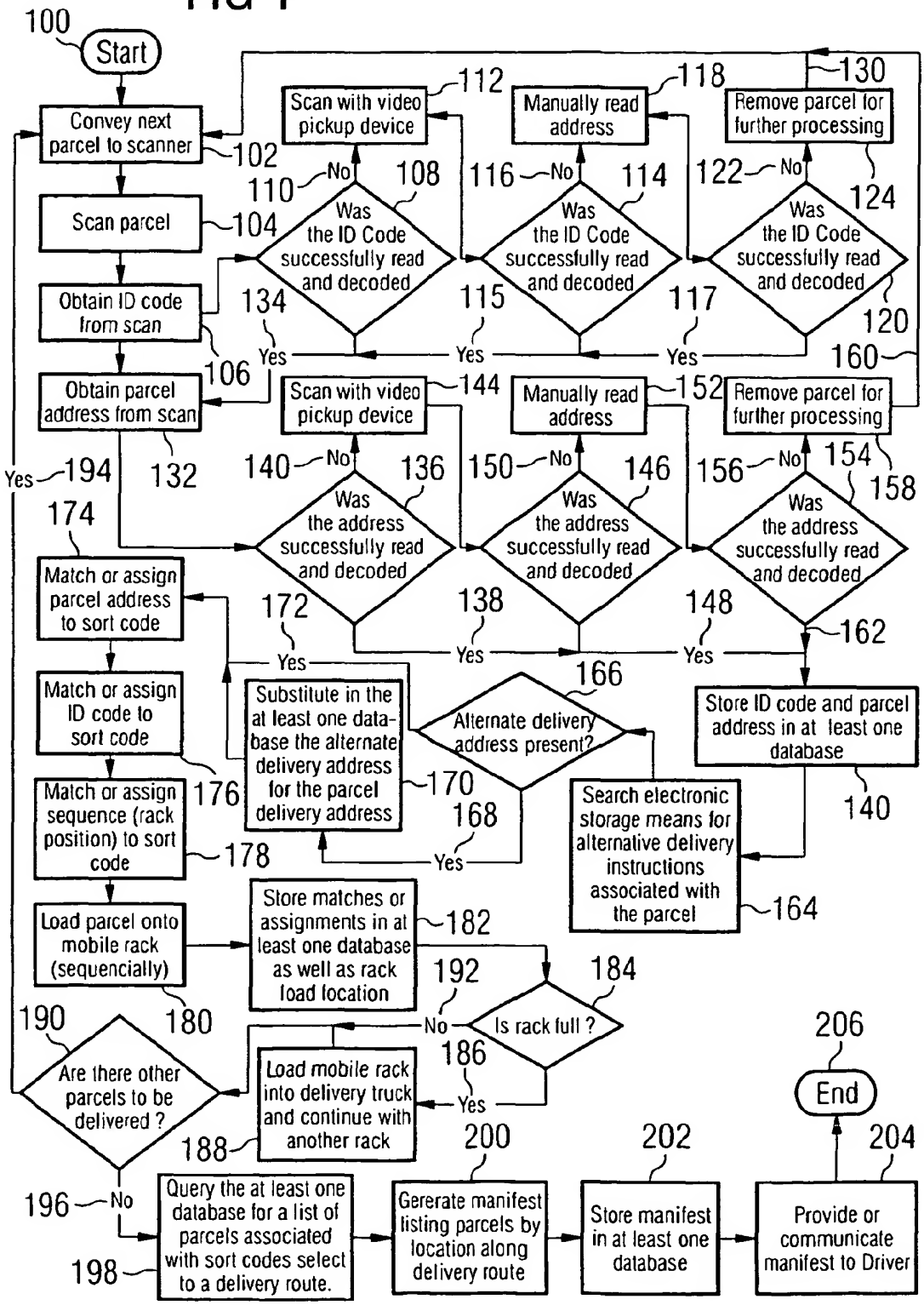

100
Start
Convey next parcel to scanner
102
Scan parcel
104
Obtain ID code from scan
106
Obtain parcel address from scan
132
Scan with video pickup device
112
Was the ID Code successfully read and decoded
108
No
110
Yes
134
Manually read address
118
Was the ID Code successfully read and decoded
114
No
116
Yes
115
Remove parcel for further processing
130
Was the ID Code successfully read and decoded
120
No
122
Yes
117
124
160
Scan with video pickup device
144
Was the address successfully read and decoded
136
No
140
Yes
138
Manually read address
152
Was the address successfully read and decoded
146
No
150
Yes
148
Remove parcel for further processing
154
Was the address successfully read and decoded
158
No
156
Yes
162
Yes
194
174
Match or assign parcel address to sort code
172
Match or assign ID code to sort code
176
Match or assign sequence (rack position) to sort code
178
Substitute in the at least one database the alternate delivery address for the parcel delivery address
170
Alternate delivery address present?
166
168
Yes
Store ID code and parcel address in at least one database
140
Search electronic storage means for alternative delivery instructions associated with the parcel
164
Load parcel onto mobile rack (sequencially)
180
Store matches or assignments in at least one database as well as rack load location
182
Is rack full ?
184
192
No
186
Yes
Load mobile rack into delivery truck and continue with another rack
188
Are there other parcels to be delivered ?
190
No
196
Yes
198
Query the at least one database for a list of parcels associated with sort codes select to a delivery route.
200
Gererate manifest listing parcels by location along delivery route
202
Store manifest in at least one database
204
Provide or communicate manifest to Driver
206
End

FIG 2

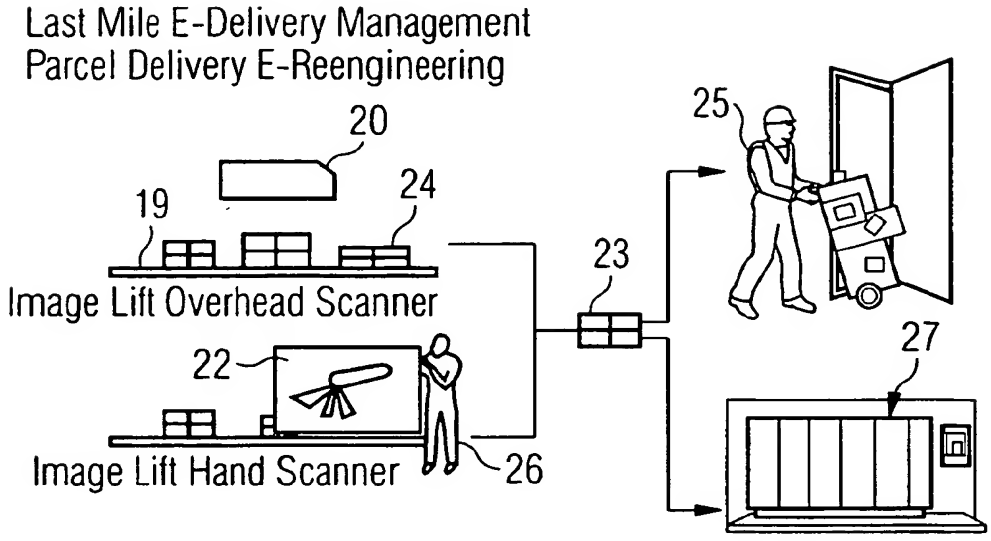

Last Mile E-Delivery Management
Parcel Delivery E-Reengineering
20
19
24
Image Lift Overhead Scanner
22
Image Lift Hand Scanner
26
23
25
27

FIG 3

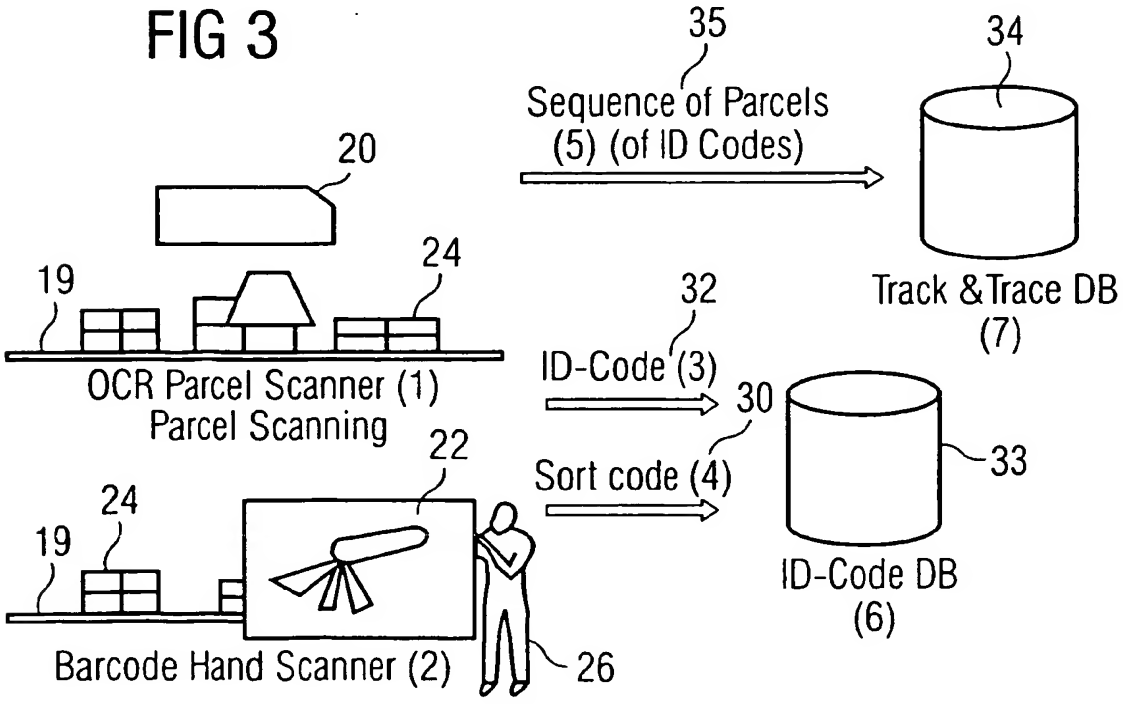

35
Sequence of Parcels
(5) (of ID Codes)
34
Track &Trace DB
(7)
20
19
24
OCR Parcel Scanner (1)
Parcel Scanning
32
ID-Code (3)
30
Sort code (4)
33
ID-Code DB
(6)
22
24
19
Barcode Hand Scanner (2)
26

FIG 4

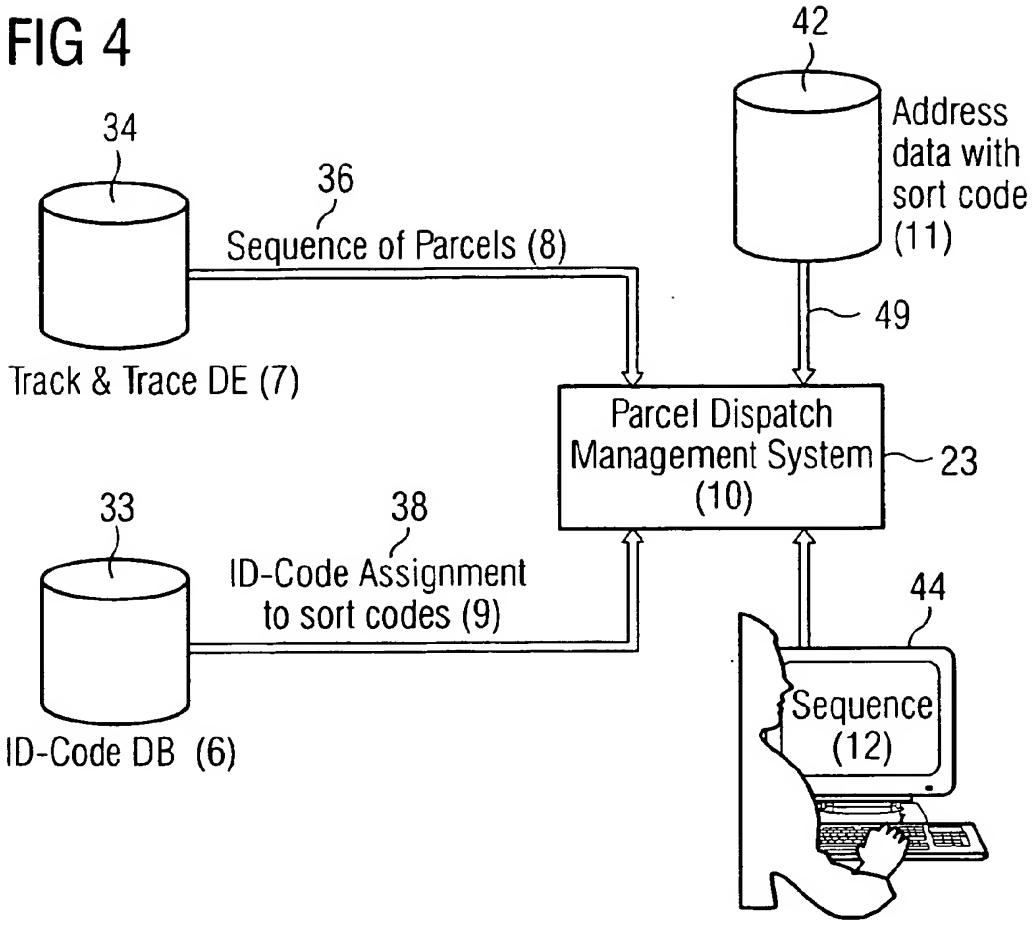

42
Address data with sort code (11)
34
36
Sequence of Parcels (8)
49
Track & Trace DE (7)
Parcel Dispatch Management System (10)
23
33
38
ID-Code Assignment to sort codes (9)
44
Sequence (12)
ID-Code DB (6)

FIG 5

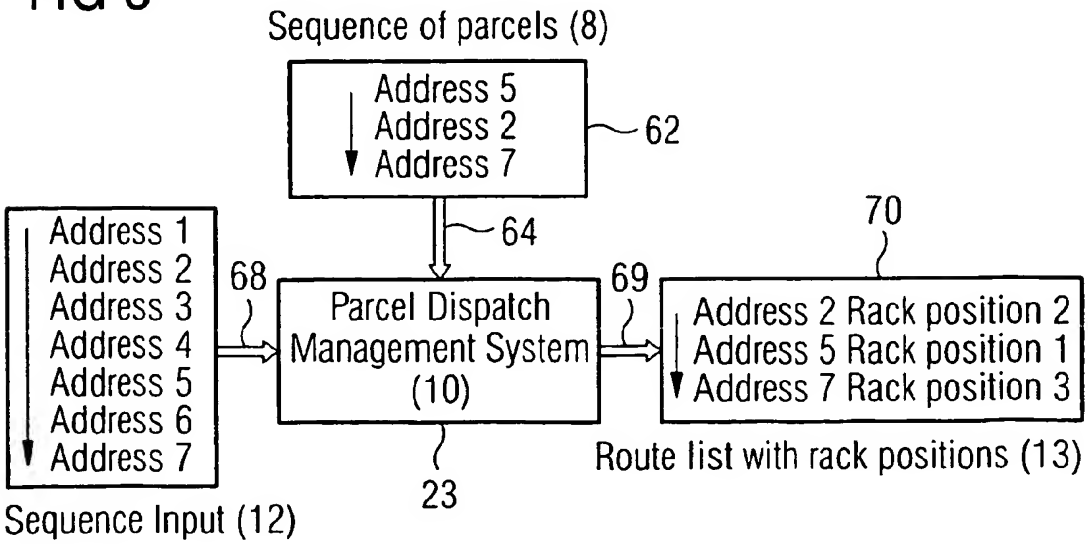
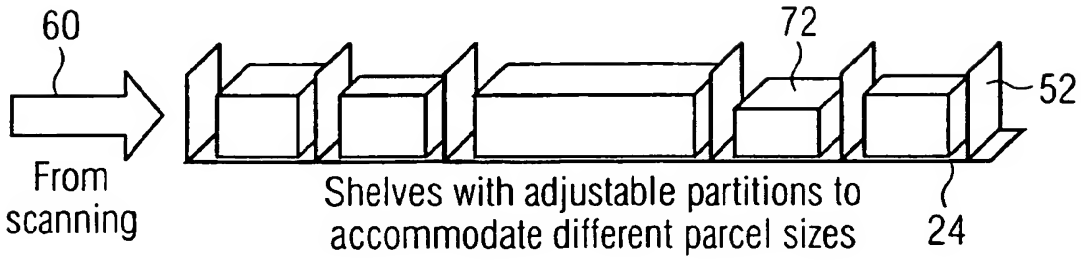
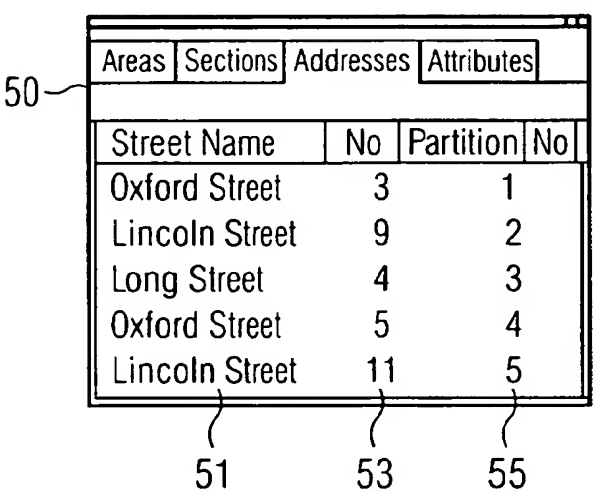
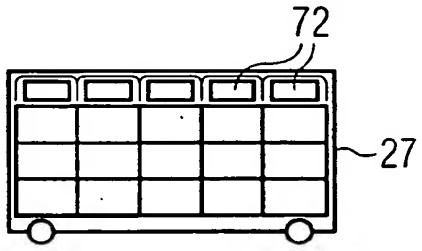

Sequence of parcels (8)
Address 5
Address 2
Address 7
62
64
70
Address 1
Address 2
Address 3
Address 4
Address 5
Address 6
Address 7
68
Parcel Dispatch Management System (10)
69
Address 2 Rack position 2
Address 5 Rack position 1
Address 7 Rack position 3
23
Route list with rack positions (13)
Sequence Input (12)

FIG 6

Last Mile E-Delivery Management
Parcel Delivery E-Reengineering